

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Observing Higgs and Goldstone modes in a supersolid quantum gas PHILIP ZUPANCIC, JULIAN LEONARD, ANDREA MORALES, TILMAN ESSLINGER, TOBIAS DONNER, ETH Zurich — We report on the realization of a supersolid with continuous translational symmetry breaking. This U(1) invariance is engineered via symmetry enhancement by coupling a Bose-Einstein condensate to the modes of two optical cavities with individual Z_2 symmetries. Spectroscopic measurements reveal the presence of a Goldstone and a Higgs mode, and our data show their energy across the supersolid phase transition. The finite cavity leakage offers a glance into real-time dynamics of the system, while the choice of cavity detunings facilitates control of symmetry-breaking fields that tune the mass of the Goldstone mode.

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Date submitted: 27 Jan 2017

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